

AMENDED SPECIFICATION

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PATENT SPECIFICATION

945,065



DRAWINGS ATTACHED

945,065

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COMPLETE SPECIFICATION

Improvements in and relating to Rotary Filters

We, SIMONACCO LIMITED (formerly Automatic Coal Cleaning Company Limited) of Durrant Hill, Carlisle, Cumberland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in rotary filters and in particular to improvements in such filters, of the disc sector or drum types. Disc filters comprise one or a series of disc filter elements mounted on a horizontal rotatable spindle. The filter elements are each of hollow construction with perforated radial walls which are enclosed in a sack-like member made of natural, artificial or metallic woven material which extends along both radial sides of the filter element and around its outer periphery. Although not essentially so, each complete filter element is conveniently made up of a plurality of sectors and each sector is enclosed in a woven sack before being assembled into its position on the hollow filter spindle to form a complete disc element. If manufactured as a complete disc, the filter element is subdivided into sectors by fluid-tight radial walls extending between the opposite axially-spaced perforated radial surfaces.

The filter discs are disposed on a horizontal hollow spindle which is rotated so that their lower radial portions depend into, and rotate through, a bath of the slurry or like material which is to be filtered. Means are provided whereby, when each sector is immersed in the slurry or the like, suction is applied through

the hollow spindle to the interior of the immersed sector and slurry is drawn against the opposite faces of the immersed sector, the liquid in the slurry being drawn through the woven material covering the sector and the solid materials adhering thereto in the form of a filter cake and being lifted out of the slurry bath as the filter disc rotates.

Before each sector re-enters the bath, pressure is applied through the hollow spindle to the inside of that sector and the filter cake is blown off the woven material into a suitable chute or the like.

Alternatively, the filter cake may be removed from the radial surfaces by doctor blades, as is described in the specification of our British Patent Serial No. 883,840.

It has been found, however, that there is a tendency for the slurry to build up on the periphery of the disc, and it cannot be expelled by the subsequent pressure phase. Thus the build-up, apparently due only to the sticky consistency of the slurry, continues to increase until it fouls the discharge chute or the base of the bath, which then, as it were, planes off the surplus material. This places an additional load on the machine.

The growth also tends to build up around the radial edges of the filter sectors and, particularly in the case of filters where the filter cake is expelled by pressure, may encroach upon the radial surfaces to such an extent that the efficiency of the filter is greatly reduced by reduction in the effective filtering area.

Filter sacks for sector disc filters normally now comprise two ring sector portions of textile

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filter material, which may conveniently be of nylon, (but which may be of other woven material such as metallic woven material), and which are adapted to cover the perforated portions of the opposite radial walls of each sector. These ring sector portions have peripheral borders secured thereto and the borders are joined together at their radial and outer peripheral edges so that they form a sack completely enclosing all the sector except the spigot or other portion on the radially-inner end by which it is attached to the hollow rotating spindle. The peripheral borders are normally made of heavy, close-woven, nylon or other like webbing, which forms a border to the filter material proper.

It is neither intended nor desired that the border material should do any filtering, but, in practice, it does so to a certain extent and, as a result, a filter cake builds up all around the border; not only on the outer periphery of each disc, but also on the radial edges of each sector on each side of the disc. This cake adheres strongly to the webbing borders, and because of the close weave of the borders and the fact that they do not lie over the perforated portions of the disc, it is extremely difficult to dislodge the cake.

The present invention has for its object the provision of means whereby the above disadvantages of unwanted slurry or filter cake deposits are substantially eliminated.

According to the invention, therefore, a filter sack for a rotatable disc or drum liquid filter comprises a sheet of liquid-pervious woven filtering material adapted to cover a perforated filtering surface of said drum or of a sector of said disc and a border of substantially liquid-impervious flexible material liquid-tightly secured to the edges of said sheet of liquid-pervious material, the edge of the border at the outer peripheral edge of said disc sector or at each of the edges of said drum being adapted to be liquid-tightly secured to an impervious portion of said disc sector or drum.

Preferably the, or each, disc of the rotatable disc filter comprises a plurality of disc sectors and two such liquid-pervious sheets are each adapted to cover one opposite radial surface of each said disc sector, one liquid-impervious border being secured to each peripheral edge of each said sheet, and the outer peripheral edges of the liquid-impervious borders secured to the radial edges and the outer peripheral edges of the pervious sheets on opposite sides of each said sector being secured to each other.

Preferably, also, the liquid-impervious flexible material from which said borders are formed comprises a polymer sheet having a woven textile polymer reinforcement integral with at least one surface thereof. The borders may, however, be formed of rubber or other similar material, preferably reinforced.

But a better understanding of the invention may be obtained from the following description of one form thereof, when this is read with reference to the accompanying drawing, of which

Figure 1 is a perspective view of one form of sack according to the invention, and

Figure 2 is a detail of Figure 1 viewed from a different aspect.

In this form of the invention, the filter disc sector 11 may be substantially as described in the specification of our British Patent Serial No. 894,318 in which case it comprises a substantially wedge-shaped member having its two major surfaces (herein referred to as its radial surfaces) separated by radial and outer peripheral walls to form a hollow body. The two major surfaces are perforated, as at 12, and are grooved or fluted as at 13. The radially-inner end of each sector is suitably formed with a spigot 14, for attachment to a rotatable hollow spindle (not shown) which serves to rotate the disc sector 11 through the material under filtration and also to carry the means whereby the interior of the sector can be alternately subjected to suction and pressure for the formation thereon of a filter cake and its subsequent removal, all as known in the art. A plurality of such disc sectors 11 is arranged circumferentially around the hollow spindle so that, collectively, they form a complete hollow disc consisting of a number of separate and independent sectors 11 to each of which alternate pressure and suction may be applied independently of the others.

Each sector 11 is covered on each of its radial surfaces by a sheet 15 of woven filter material of such weave that it prevents the passage of solid material therethrough, but is pervious to liquid. Although these sheets 15 may be made of any suitable known filter material, we prefer that they should be made of a heavy quality woven textile polymer material such as, but not essentially, nylon.

The sheets 15 are substantially the same shape as the radial surfaces of the sector 11, and to their peripheral edges are secured border strips 16, 17, 18 of a water-impervious material each comprising two complementary sections. This material may be of any completely impervious flexible material such as rubber, but is preferably an impervious polymer material which is reinforced in the known way by embedded or attached textile material which serves to strengthen the impervious polymer.

The free, or outer peripheral, edges 19 of the complementary sections of the borders 16 secured to each radial edge of each sheet 15 are, when the sheets 15 are positioned against opposite radial surfaces of a sector 11, drawn over the edges from each opposite surface and are then secured together. The outer peripheral edges of the border strips 17 are secured to opposite edges of an impervious mailing

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- strip 21 laid around the peripheral edge of each sector 11. Where the strips 16 are turned over on to the outer periphery of the nailing strip 21, the stitching 23 is discontinued and the strips 16 are superimposed so that they lie flat. The strips 17 are turned over the nailing strip 21 in opposite directions to underlie the ends of the strips 16 at each end.
- 5 The radially inner edge of the border 18 is similarly secured to the inner ends of the borders 16 which are secured to an impervious "sock" 22 which partially encloses the spigot 14.
- 10 The edges 19 may be secured together by a suitable polymer cement. It is preferred, however, that they should be sewn with a suitable natural or polymer thread.
- 15 Where the borders are secured by sewing, there is a tendency for a strip of cake to build up along the line of the stitches and to prevent this the sewing lines 23 are subsequently sealed off by an application of hard setting wax, varnish or polymer resin, or by securing a strip of non-porous material over the stitches. Alternatively, the sewing may be performed from the inside of the sack, which is then turned inside out so that the sewing is on the inside edge of the impervious material.
- 20 Even then, however, there may be some small deposit due to the needle holes through the impervious border, and the first-mentioned procedure is preferred.
- 25 Liquid impervious sealing strips 24 are used as and where required and may be used to secure the woven filter material to the impervious borders, 16, 17 and 18. Strips 24 are shown partially unstitched in the drawing.
- 30 Although the above description describes the borders 16, 17 and 18 as being inherently impervious, this characteristic may be obtained by suitable sealing treatment of a material which is itself naturally porous. This may be achieved by treating the porous material, before or after application, with a coating or impregnation of varnish, hard setting wax, a polymer resin or the like.
- 35 The invention may also be applied to a drum filter which comprises a radially subdivided cylinder having a perforated peripheral wall over which a woven filter material is stretched. The radial surfaces of the ends of the cylinder are naturally impervious or are covered with impervious material and impervious borders are secured to the woven material to overlap onto and be secured to these ends. Impervious strips are also secured to the woven material to coincide with the junction of each radial division with the perforated peripheral wall of the cylinder.
- 40 As the latter embodiment will be obvious from the earlier description of one form of the invention a more detailed description and drawings thereof are not considered necessary.
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- WHAT WE CLAIM IS:—
1. A filter sack for a rotatable disc or drum liquid filter, comprising a sheet of liquid-pervious woven filtering material adapted to cover a perforated filtering surface of said drum or a sector of said disc and a border of substantially liquid - impervious flexible material, liquid-tightly secured to the edges of said sheet of liquid-pervious material, the edge of the border at the outer peripheral edge of said disc sector or at each of the edges of said drum being adapted to be liquid-tightly secured to an impervious portion of said disc sector or drum.
 2. A filter sack according to claim 1, comprising two said sheets, each in the form of a ring sector and each adapted to be applied to one perforated surface of a hollow filter disc sector, an impervious border comprising two complementary sections and adapted to be secured to each radial edge of each said ring sector and to the inner and outer peripheral edges thereof and means to secure together the adjacent edges of the borders adapted to be secured to corresponding radial edges of said ring sectors to form a sack adapted to enclose said filter disc sector when said filter disc sector is inserted in said sack.
 3. A filter sack according to claim 2 comprising an impervious sack attached to the impervious border at a position corresponding to the inner peripheral edges of said ring sectors and adapted partially to enclose the spigot on said filter disc sector when said disc sector is inserted in said sack.
 4. A filter sack according to any preceding claim, wherein the edge or edges of said borders adapted to be secured to the outer peripheral edge or edges of said disc or drum respectively are adapted to be secured to an impervious wooden nailing strip secured to said drum or disc.
 5. A filter sack according to any one of claims 1 to 4, wherein the edges of the complementary sections of said borders are secured together by sewing and said sewing is subsequently sealed by varnish, wax or other similar sealing material.
 6. A filter sack according to any preceding claim, wherein said liquid-impervious material comprises a polymer sheet having a woven textile polymer reinforcement attached thereto or embedded therein.
 7. A filter sack according to any preceding claim, comprising a liquid-impervious sealing strip attached to, and overlying, the edges of said liquid-pervious sheet at their junction with said liquid-impervious borders.
 8. A filter sack according to any preceding claim, wherein said liquid-pervious sheet comprises a woven polymer fabric.
 9. A filter sack according to any one of claims 1 to 7, wherein said liquid-pervious sheet comprises a woven metallic wire fabric.

10. A rotatable disc filter comprising a filter sack as claimed in any one of claims 1 to 9.
11. A rotatable disc filter sector comprising 5 a filter sack as claimed in any of claims 1 to 9.
12. A filter sack for a rotatable disc filter substantially as herein described with reference to the accompanying drawing.
13. A filter sack for a sector of a rotatable disc filter substantially as herein described and 10 as illustrated in the accompanying drawing.

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1 SHEET AMENDED SPECIFICATION
*This drawing is a reproduction of
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